

**A NEW SPECIES OF BRACHYCENTRUS FROM GEORGIA
WITH TWO UNUSUAL LARVEL CHARACTERS
(TRICHOPTERA: BRACHYCENTRIDAE)¹**

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In several vials of Trichoptera larvae sent to the University of Georgia by Dr. W. L. Peters of Florida A & M University, there were some larvae of an unusual brachycentrid that Dr. Peters had collected from the Etowah River in north central Georgia. These larvae have several characters that would place them near the western genus *Oligoplectrum* in Wiggins, (1965) key to the genera of North American Brachycentridae larvae. Several visits to the area where the larvae were first found resulted in association of all life stages. The adults proved to be a new species of *Brachycentrus* near *B. numerosus* (Say). The following is an account of the taxonomy and biology of this new species.

***Brachycentrus etowahensis* NEW SPECIES**

MALE.—Length=8-10 mm; dark brown to black. Antennae about same length as body. Maxillary palps 3 segmented and curved upward over face, basal segment short and somewhat globular, palps with long, dense white setae occasionally intermixed with a few scattered, black setae near base of palps. Last two segments of labial palps distinctly lighter in color than basal segment. Tibia and tarsi of all legs light, femora dark. Tibial spurs 2, 3, 3. Wings pale brown with venation as in Figs. 7 and 8. Seventh abdominal sternite produced into a rather wide posteroventral plate that is generally broader than long (Fig. 5). Genitalia as in Fig. 1. Ninth segment narrowed dorsally. Cerci somewhat variable, generally ovate, often somewhat pointed ventro-apically, and separated

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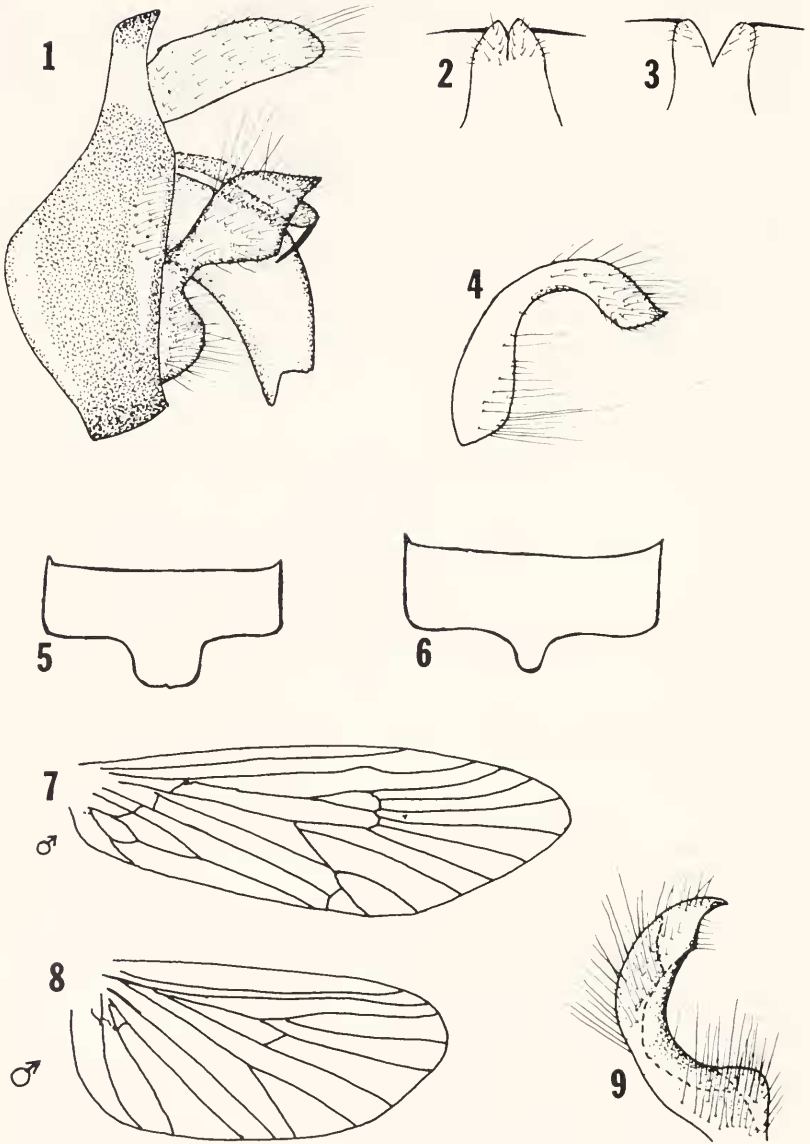


FIG. 1-9. 1, *Brachycentrus etowahensis* male genitalia, lateral view; 2, tenth tergite of same, dorsal view; 3, same of *B. numerosus*; 4, *B. numerosus* clasper, lateral view; 5, seventh sternite of male *etowahensis*; 6, same of *numerosus*; 7, forewing of male *etowahensis*; 8, hindwing of same; 9, clasper of male *etowahensis*, ventral view.

to base. Claspers broad, curved, with base somewhat rounded in lateral view (Fig. 1), broadest at a distance about 1/3 from their apices, and curved inward to a rather sharp point at their apices in ventral view (Fig. 9). Tenth tergite with a small mesal notch apically; with a mesal fracture line continuing anteriorly from the base of the notch, this fracture line about twice the length of the notch; each of the two contiguous apical processes bears 1 (rarely 2) long macrochaeta in addition to 8-12 smaller setae (Fig. 2).

FEMALE.—Length 10-12 mm. Dark brown to black. Antennae shorter than wings. Legs patterned as described in male above. Wings pale brown with some scattered white hair. Wing venation as in Figs. 12 and 13. Genitalia as in Figs. 10 and 11. Eighth sternite with lateroapical lobes only slightly produced (Fig. 10). Apical tergite short, and truncated posteriorly in lateral view (Fig. 11).

Holotype ♂; Etowah River, 5.5 miles southeast of Ball Ground, Cherokee Co., Georgia (reared); pupa coll. 12 April, 1971; adult emerged 9 May, 1971, J. B. Wallace and W. R. Woodall. Paratypes; same data as holotype (reared) 1 ♂, 2 ♀; same locality as holotype (sweeping) 25 April, 1971, 25 ♂, 22 ♀, J. B. Wallace and W. R. Woodall. Specimens deposited in University of Georgia collection.

REMARKS.—On the basis of male genitalia *B. etowahensis* appears to be closely related to *B. numerosus* (Say). However, the two species can be readily separated on the basis of the tenth tergite of the males. In *numerosus* there is a deep division down the meson of the tenth tergite and the apical processes of this tergite are widely divergent; at the apex of each arm there is one (occasionally 2) large macrochaeta (Fig. 3). In *etowahensis* the apical notch of the tenth tergite is much smaller and the arms touch over much of their distance and do not diverge apically (Fig. 2). The clasper of *etowahensis* is also wider in lateral view than that of *numerosus* (cf. Figs. 1 and 4). In addition, the posteroventral process of the seventh abdominal sternite is much wider, in ventral view, in *etowahensis* (Fig. 5) than in *numerosus* (Fig. 6).

The female genitalia are very similar to *numerosus*. They can apparently be separated on the basis of the lateroapical corners of the eighth sternite which are slightly expanded in *etowahensis* (Fig. 11) compared to the rather wide and large apical sternites in *numerosus* (Ross 1944, Fig. 902A).

EGG MASS.—Eggs embedded in a somewhat flattened gelatinous sphere as in Fig. 16.

MATURE LARVA.—Length to 12 mm. Head: pale yellowish brown with black

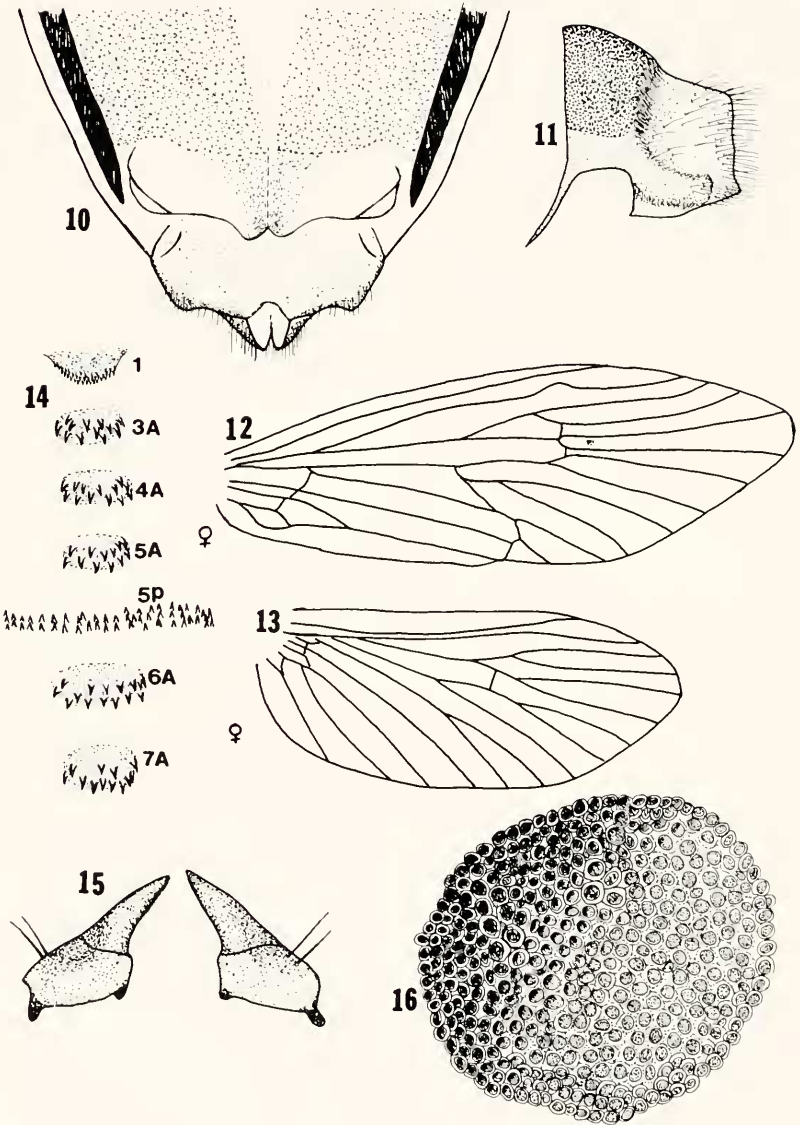


FIG. 10-16. *B. etowahensis*. 10, female genitalia, ventral view; 11, ninth and tenth tergites of same, lateral view; 12, forewing of female; 13, hindwing of same; 14, dorsal abdominal hooks of pupa; 15, pupal mandibles, ventral view; 16, egg mass.

markings as in Fig. 17. Two large conspicuous light spots on frons below constriction, with a large dorsal and a smaller ventrad spot on frons above constriction; large pale areas also located laterad of each large setae near the confluence of the frontoclypeal and epicranial sutures; lateral margins of head pale (Fig. 17). Ridge near anteriolateral margin of head extending as far as eye. Setae of head as Fig. 17. Thorax-dorsal plates all pale yellowish brown; primary mesonotal plate subdivided into four plates, the two inner plates much larger than lateral plates (Fig. 18). Legs-pale yellowish brown, femora of meso- and metathoracic legs each with a narrow black stripe dorsally that runs the entire length of femur. Meso- and metathoracic legs long, each tibia with a prominent distal process bearing a stout spine. Femora of last two legs with 2 to 5 stout setae on each side (Figs. 19B and C). (This latter condition is apparently unique for the genus). Femora, tibiae and tarsi of last two pairs of legs with a row of comb like setae ventrally. Abdomen-All gills single; segments 3-6 with a lateral fringe of fine hair, segment 7 with a minute fringe of hair posteriorly. Dorsum of 9th segment with a pale plate bearing approximately 20 setae. Claw of anal proleg with a large ventral claw and two smaller dorsal claws. Description based on 15 specimens, same locality as holotype male, collected on 2 October, 1970; 18 February, 1971; 12 April, 1971.

PUPA.—Length 9-11 mm. Typical of the genus *Brachycentrus*, with abdominal plate 5p consisting of transverse rows of hooks (Fig. 14). Abdomen with a dense fringe of hairs starting at the posteriolateral margin of segments 5, and running posteriorly to segment 8 where the fringe curves underneath that segment, ending before reaching ventral midline of segment 8. Posterior end of abdomen with two slender projections each about 0.6 mm in length. Membrane closing anterior end of case as in Fig. 21. Description based on 4 pupae, same locality as holotype male, 25 April, 1971.

LARVAL CASE.—Length to 13 mm; width to 2.5 mm. Cylindrical and made of sand grains with numerous "spikes" as in Fig. 20. Most of the "spikes" consist of rock material, occasionally a few are composed of plant material. Case larger anteriorly, tapering slightly toward the rear.

BIOLOGY

The larvae of *B. etowahensis* were found in a medium sized river, the Etowah, which is about 40-50 yards in width and drains the southern tip of the Appalachians in north central Georgia. The Etowah is one of the smaller headwater rivers of the Coosa River Basin which in turn drains into the Alabama. The larvae were associated with small stones 2-4 inches in diameter on the bottom of the river bed in rather swift current, up to 3 ft./sec. The larvae were most commonly found associated with the scattered, sparse *Podostemum ceratophyllum* (Podostemaceae) mat that was growing on the surface of the stones. They were located in water that was 2-6 feet in depth. Few

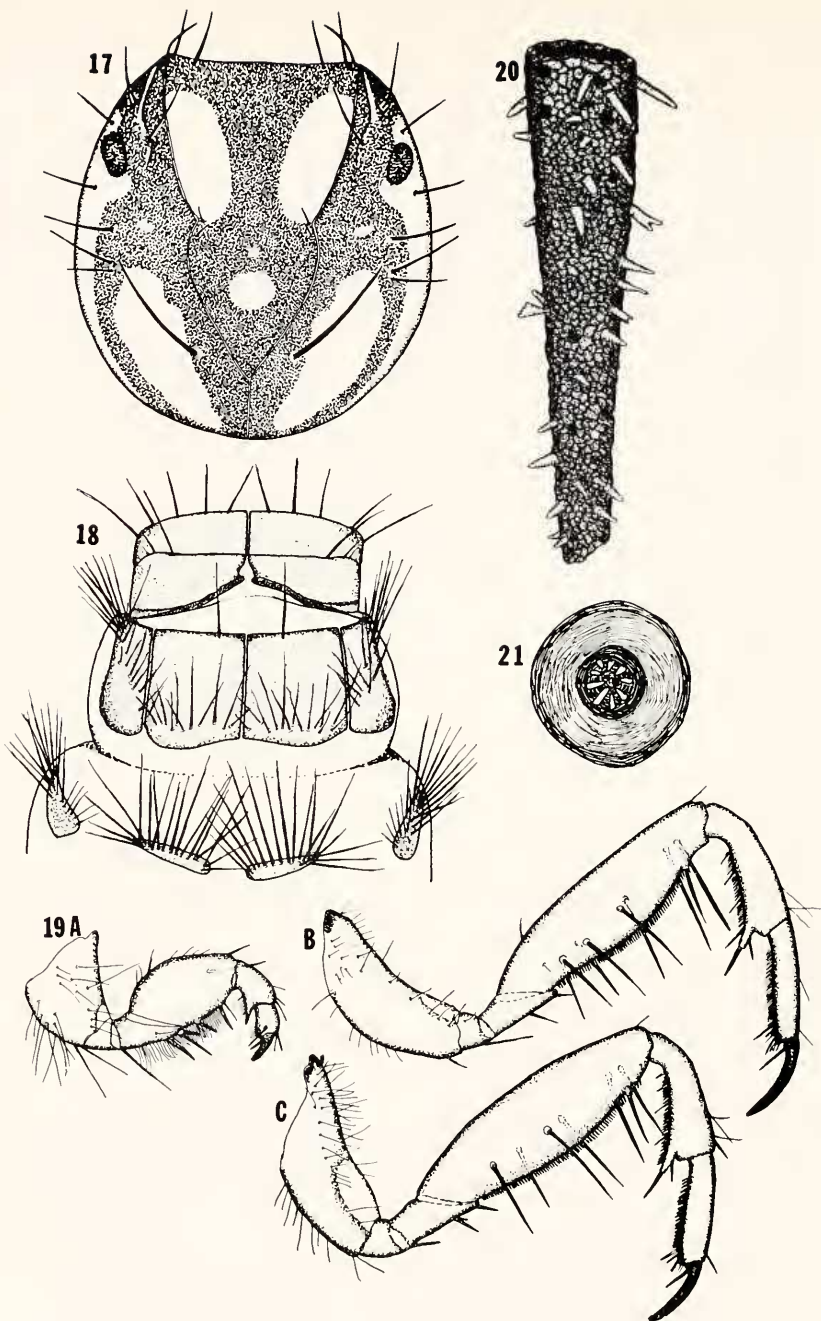


FIG. 17-21. *B. etowahensis*. 17, head of mature larva, dorsal view; 18, thorax of same; 19A, prothoracic leg of same; B, mesothoracic leg of same; C, metathoracic leg of same; 20, larval case, lateral view; 21, anterior closure membrane of pupal case.

or no larvae were found in the areas of the stream where the bottom consisted solely of sand or large rocks.

Larvae were found on the top of these rocks, their cases often attached to the *Podostemum*. The larvae always faced directly into the current and in typical *Brachycentrus* fashion they had the meso- and metathoracic legs extended above the thorax as they protrude from the anterior end of the case. Nielsen (1943), Mecom and Cummins (1964) report that larvae utilize this as a technique for filtering food from the swift flowing water.

As mentioned previously, larvae construct rather curious cases of sand grains with numerous "spikes" composed largely of sand grains arranged in somewhat of a whorl around the case (Fig. 20). This is apparently the first case of this type reported for the Brachycentridae. One possible advantage offered by these "spikes" is that they aid in anchoring the case along the bottom in the swift current since most of the spikes project slightly toward the rear of the case. One rather interesting observation was that the spikes on the spring collected cases are much shorter and fewer in number than the autumn collected specimens. This suggests that during high water levels and accompanying swift currents during the winter months the cases are subjected to considerable wear.

Brachycentrus etowahensis appears to have 1 generation per year. The larvae apparently reach the final instar by late autumn and overwinter in this condition. By mid-April when the water temperature reaches 15°C the larvae begin closing their cases. The pupae are found in the same habitat as that occupied by the larvae and are generally attached to *Podostemum*. In the late afternoon of 25 April, 1971, thousands of adults were in flight at the Etowah River. The adults were flying as high as about 6 feet above the stream. A number of the females had the characteristic globular egg masses (Fig. 16) at the apex of their abdomen. About 90 percent of the adults were flying upstream. This apparently characteristic upstream flight of the Trichoptera has been proposed as a means of compensating for downstream drift that occurs in the larval stage (Roos 1957). Light trap collections made on the night of 25 April, 1971, yielded no *B. etowahensis*, indicating that perhaps the adults are not attracted to light.

The water temperature during the collection period varied from 4°C in winter to 15°C in the spring when the adults were emerging. The dissolved O₂ varied from 8.6 to 12 ppm. The following data were

collected by the Georgia State Water Quality Control Board Report on the Coosa River Basin Study Report (1970) in the vicinity of the Etowah where larvae were obtained: BOD₅=0.5 mg/l; pH=6.9; alkalinity (total) mg/l as CaCO₃-15; spec. cond. (umko/cm 25C)=37; and coliform mpn/100 ml total=4300, fecal=2300.

DISCUSSION

B. etowahensis presents several interesting problems in its phylogenetic placing. The wing venation of the adult as well as the male genitalia place this species in the genus *Brachycentrus* as currently recognized. As previously mentioned, the genitalia indicate *B. etowahensis* is closely allied to *B. numerosus* (Say). However, the larval stage of *B. etowahensis* possesses two interesting and rather unusual features. The circular, stone case with a whorl of "spikes" projecting slightly toward the rear (Fig. 20) appears to be unique not only for the genus, but for the entire family. The majority of *Brachycentrus* larvae construct the familiar 4-sided chimney cases of plant material. The femora of the second and third legs each possess 2 or 4 long stout bristles along each side (Figs. 19B and C).

The above characters (with the exception of the "spikes" on the cases) were used by Wiggins (1965) to separate *Oligoplectrum* from *Brachycentrus*. Based on the case character and bristles of the femora of the mid- and hindlegs, *etowahensis* will key to *Oligoplectrum* in the above key to North American larvae.

Obviously, from the information discussed in this paper, a thorough study of the Brachycentridae is needed to elucidate the relationships of members of this family.

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2.0126. A new species of *Brachycentrus* from Georgia with two unusual larval characters (Trichoptera: Brachycentridae).

ABSTRACT.—*Brachycentrus etowahensis* n. sp., is described from north central Georgia. The immature stages, eggs, larvae, and pupae have been associated and descriptions of each stage are given. The larvae have two features which do not agree with existing larval diagnoses and keys for *Brachycentrus* in the North American fauna. The case making behavior appears to be unique for the family Brachycentridae.—J. B. WALLACE, Department of Entomology, University of Georgia, Athens, GA 30601.

Descriptors: Trichoptera; *Brachycentrus etowahensis*, new species; biology; immature stages; Georgia.